

1.0 INTRODUCTION

The U.S. Department of Energy (DOE) proposes to increase approved radionuclide land loading limits for the Oak Ridge Reservation (ORR) Biosolids Land Application Sites from a cumulative dose of 4 mrem/yr to 10 mrem/yr and to add treated, effluent discharges from the Y-12 West End Treatment Facility (WETF) into the Y-12 and City of Oak Ridge Sanitary Sewer Systems. If potentially significant environmental impacts are found to be associated with the increase from 4 mrem/yr to 10 mrem/yr and addition of the treated WETF discharges into the sewer system, an environmental impact statement will be prepared; if not, DOE will issue a Finding of No Significant Impact (FONSI) and proceed with the proposed action.

Public involvement is important to the NEPA process. Prior to preparation of this EA, public input was requested and a DOE Informational Session will be forthcoming. Informational handouts, a computerized presentation, and resource personnel will be available to explain the biosolids land application program and potential program changes. On February 15, 2001, DOE published a Notice to Prepare an EA. This notice included names of individuals to contact with comments or requests for copies of the EA. Two presentations were made to the Site Specific Advisory Board Waste Management Committee with a tour of the biosolids land application sites and WETF conducted on June 18, 2001 to discuss the proposed action. The public comment period occurred from October 1 to November 21, 2002. A total of 67 comments were received. Original comments received and comment responses are attached to this document.

1.1 PURPOSE AND NEED FOR AGENCY ACTION

DOE and the City of Oak Ridge have jointly sponsored the ORR Biosolids Land Application Program since 1984. This program allows for the beneficial re-use of treated, biosolids (i.e., sewage sludge) on open hayfields and reforestation plots on EPA-permitted land application sites. Since 1999, the City of Oak Ridge began accepting ORNL biosolids in the existing land application program. In addition, multiple industrial sources with the potential to discharge radionuclides exist, resulting in an extremely limited capacity for future industrial growth within the boundaries of Oak Ridge.

The specific impacts upon human health and the environment will be assessed in this National Environmental Policy Act (NEPA) document as part of the decision-making process to determine if the 10 mrem/yr planning level increase for the Oak Ridge Reservation Biosolids Land Application Sites and the addition of treated WETF effluents to the sewer system should be implemented.

The proposed action would allow the future expansion of additional industrial users to the City of Oak Ridge Sewer System and implement a more effective method of managing treated wastewater from WETF than the current method, which is the discharge of treated wastewaters through the existing Y-12 National Pollutant Discharge Elimination System (NPDES) point, at a higher sampling and materials treatment cost.

This action is driven by (1) the need for expanded radionuclide capacity on active ORR land application sites such as not to impact industrial growth within the City of Oak Ridge, (2) the need to assist the City of Oak Ridge in economic development and (3) the need to reduce the cost of current wastewater effluent discharges at WETF.

DOE Oak Ridge Operations (ORO) has established self-imposed, dose-based (4 mrem/yr) radionuclide limits for ORR application site soils and city biosolids to maximize the beneficial nutrient qualities of the material while effectively managing the trace radionuclides contained within the material. These limits were developed to prevent any future remedial activities involving biosolids amended soils. Presently, the City of Oak Ridge has reached the maximum level of radionuclides that can be issued to industrial dischargers within the city sewer system and needs the existing planning level of 4 mrem/yr to be raised to 10 mrem/yr.

Because of limited capacity for future industrial growth within the City of Oak Ridge Sewer System, the city consulted for short and long-term solutions to this problem. The short term solution was determined to minimize the acceptance of any additional dischargers to the city sewer system that may contain radionuclides within their effluent discharges. The long-term solution involved increasing land application site loading criteria from a cumulative dose-based on 4 mrem/yr to one based on 10 mrem/yr, for a maximally exposed individual. The concurrence letter from TDEC is available in *Appendix A*.

This would allow the city to allocate radionuclide planning levels for future dischargers based upon operational need while not impeding future commercial growth within the City of Oak Ridge or affecting day to day operations. It should be noted that the existing and proposed radionuclide planning levels reflect the conceptual, worst-case exposure scenario that a person residing on the actual application site, eating food and drinking water exposed to the radionuclides that have been land-applied with the city biosolids. In reality, the existing sites are isolated from members of the public and access is controlled through ORR security because of the application site proximity to the Y-12 Plant. The proposed 10 mrem/yr planning level is extremely conservative considering that established Nuclear Regulatory Commission (NRC) radionuclide clean-up criteria is 25 mrem/yr. When compared to other exposures received by members of the general public on a day to day basis, the proposed planning level is also very conservative.

The planning level increase is required to allow future industrial growth for both government and commercial industries while minimizing impacts upon existing City of Oak Ridge wastewater treatment and biosolids beneficial re-use operations.

1.2 BACKGROUND

The current biosolids land application sites are located on the ORR in Oak Ridge, Tennessee (*Figure 1.1*).

1.2.1 Oak Ridge Reservation Biosolids Land Application Sites

The City of Oak Ridge, Tennessee, owns and operates a publicly owned treatment works (POTW) that receives wastewater from a variety of industrial, commercial, and residential generators in the Anderson/Roane County area. One of the chief contributors, with approximately 20% of the POTW's total influent (DOE 1996), is the U.S. Department of Energy (DOE) Y-12 Plant. All industrial generators are required by Oak Ridge City Ordinance Number 9-91 to obtain an industrial discharge permit (IDP) from the city, which prescribes discharge limits and monitoring/reporting requirements.

Under a land-license agreement (DOE 2000) with DOE, the City of Oak Ridge has been applying municipal biosolids as a beneficial soil amendment on the ORR since 1983 (DOE 1996). To date, no spills or traffic accidents have occurred since the program began.

The City of Oak Ridge Biosolids Land Application Program has been recognized for excellence in beneficial re-use and program management by the Tennessee/Kentucky Water Environment Association (WEA) in 1997 and EPA, Region IV in 1999. The existing land application sites have had no known historical operations or projects conducted on them prior to being approved for biosolids application. The sites are not adjacent to existing structures, houses, landmarks, recreational areas and are somewhat isolated from the public except for coordinated turkey and deer hunts and security personnel.

In October 1996 the ORR Biosolids Land Application Program prepared an EA (DOE 1996) that evaluated total site capacity, the addition of ORNL and ETTP sanitary wastewater treatment plant biosolids and the establishment of application site soil and biosolids radionuclide planning levels based upon a 4 mrem/yr cumulative dose modeling scenario. Upon completion of the EA, a Finding of No Significant Impact (FONSI) was issued in November 1996.

Municipal biosolids are not considered a Resource Conservation and Recovery Act (RCRA) waste but are regulated under the provisions of 40 *Code of Federal Regulations* (CFR) Part 503 of the Clean Water Act (CWA). EPA establishes standards for biosolids use and disposal, including risk-based, metal-loading criteria for the receiving soil, as specified in 40 CFR Part 503. Non-radiological program requirements are imposed by the State of Tennessee via the city's NPDES permit (TDEC 1998), State Land Application Approval (LAA), EPA permit #TNL024155 (EPA 1997) and EPA regulations listed in 40 CFR Part 503 (EPA 1993). The characteristics of the city biosolids are described in *Appendix B, Tables B.1* through *B.4* show the concentrations of inorganic chemicals, heavy metals, organic chemicals, and radionuclides. Biosolids land application site profiles are also discussed in *Appendix B Tables B.5* through *B.10*. Although Oak Ridge biosolids contains trace amounts of inorganic nutrients, heavy metals and radionuclides, as do most municipal biosolids, levels are well within prescribed limits as mandated by the Tennessee Department of Environment and Conservation (TDEC), EPA and DOE.

Biosolids recycling and land application, which are the terms EPA uses for biosolids applied to land for its beneficial properties (58 *FR* 9321 Standards for the Use or Disposal of Biosolids; Final Rule 1993), consists of distributing liquid, solid, or composted biosolids on or just below the soil surface where it is employed as a fertilizer or soil conditioner. For example, beneficial uses may include improving tree growth for hardwood reforestation, increasing organic matter and enhancing soil tilth for hay production or growth of native species, or helping to restore disturbed areas by providing nutrients for new seedlings.

Land application as currently practiced by the City of Oak Ridge currently involves spraying liquid biosolids (2 to 3% solids) under pressure from a tanker, resulting in a thin layer of biosolids on the soil surface and vegetation. The City of Oak Ridge currently trucks 2 to 6 loads/day (40 to 120 loads/month) of biosolids in the city-owned 20,400-L (5,400-gal) tanker truck to the active land application sites. On the ORR, the biosolids are transferred to a 5,300-L (1,400-gal) field vehicle for surface spray application (DOE 1996). In addition to the high-pressure surface spray, biosolids can also be applied by the same application vehicle using spray nozzles at the rear of the vehicle.

In the Summer of 2001, the City of Oak Ridge implemented a new de-watering and thermal treatment system that increased the solids content and sterilize the biosolids hauled and dispersed at the ORR land application sites, resulting in a more manageable, safer material. This material is applied using manure spreading equipment in a calibrated dispersion pattern. This minimizes the potential for over-application and results in an operational cost savings by reducing the transportation costs to land apply biosolids from 36 to 2 or 3 trips. Biosolids have been applied to TDEC-approved, EPA-permitted sites at a calculated agronomic (i.e., nitrogen) rate. This rate is based directly upon past amounts of application, the amount of nitrogen within the biosolids material being applied and what are the specific vegetative nitrogen growth requirements. The rate is calculated annually, and changes as the nitrogen levels and the total amount of biosolids are applied throughout each calendar year. Each site also has a cumulative lifetime loading limit of 50 tons/acre (dry wt.) that has been approved by TDEC and DOE (DOE 1996).

Figure 1.1. Oak Ridge Biosolids Land Application Sites

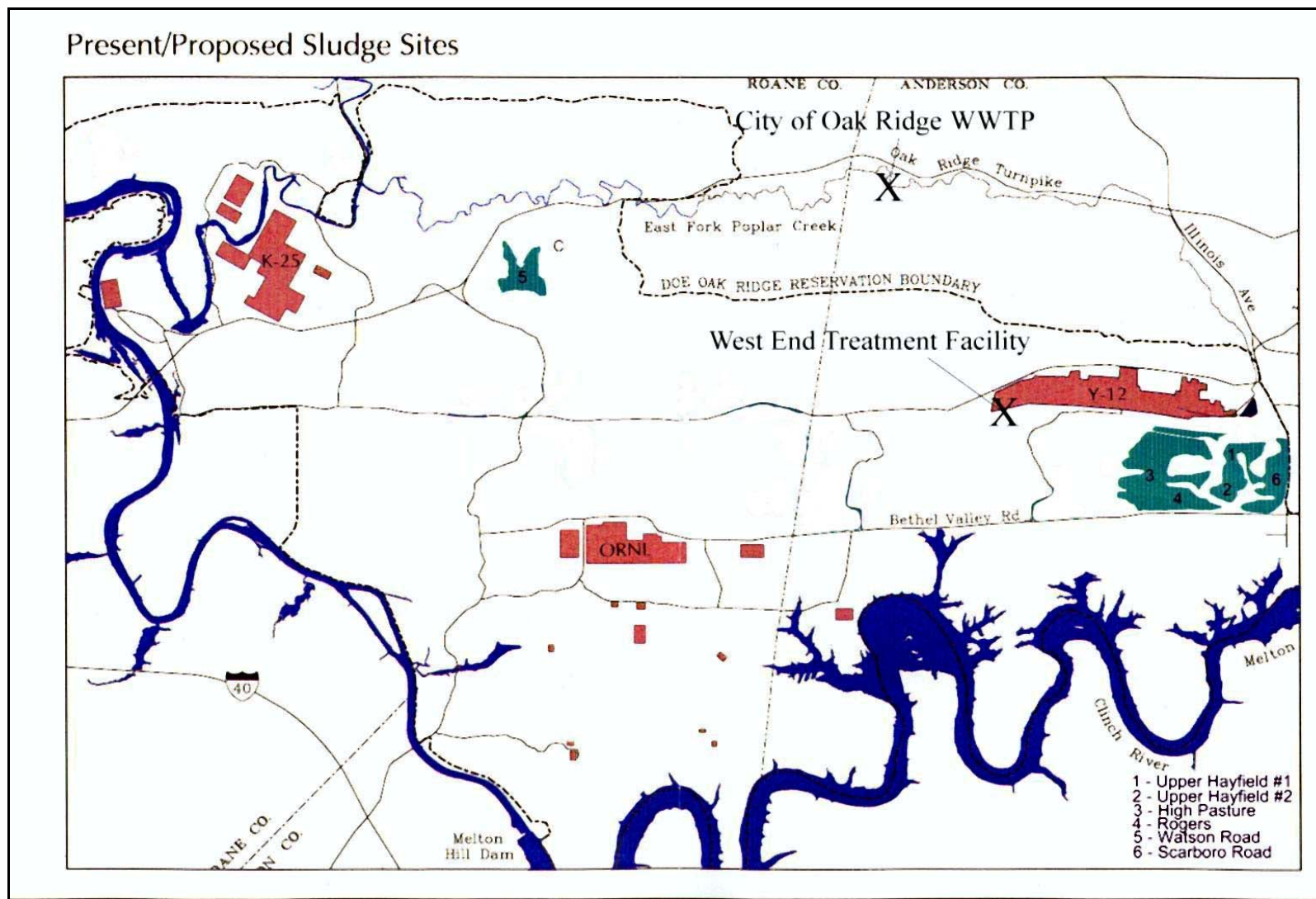


Table 1.1. Oak Ridge Reservation Biosolids Land Application Sites

Site Name	Status	Acres (Ac)	Hectares (ha)
Upper Hayfield #1	Active	30	12.15
Upper Hayfield #2	Active	27	10.93
High Pasture	Active	46	18.62
Watson Road	Active	117	47.37
Scarboro Road	Active	77	31.17
Rogers	Active	32	12.96
McCoy	Inactive	23	9.31
Cottonwoods	Inactive	17	6.88
Site #8	Inactive	12	4.85

There are six active land application sites totaling 133 ha (329 acres) on the ORR (*Table 1.1* and *Figure 1.1*). Three previously utilized sites totaling 21 ha (52 acres) are currently inactive (*Table 1.1*). Any actions by DOE to manage biosolids must comply with federal and state laws and DOE regulations (see *Section 6.0*).

Biosolids typically contains both natural and human-made radionuclides. In 1995, the American Metropolitan Sewer Association (AMSA) conducted a radionuclide survey (AMSA 1995) of biosolids produced at over 100 POTWs located in heavily populated areas of the U.S. All POTWs exhibited some level of radioactivity, some had levels of particular concern. This concern prompted a nationwide survey of over 300 POTWs by the EPA and Nuclear Regulatory Commission (NRC) for the purposes of formulating baseline radioactivity data associated with biosolids products. The results of this survey will be made available to the public in future months.

Because there are currently no applicable federal biosolids radioactivity standards, the state, the City of Oak Ridge and DOE established conservative biosolids land application site soil planning levels for 23 specific radionuclides based upon a 4 mrem/yr, 365-day per year homesteader (i.e. living on site) utilizing 9 pathways of exposure in the previously approved EA. Residual Radioactivity (RESRAD) modeling of the previously-approved EA summarizes the methodology for establishing dose-based radionuclide planning levels for the land application program. In addition, the City of Oak Ridge operates an on-site gamma spectrometer system that analyzes the biosolids radionuclide content land applied each day.

This system has established action levels that prevent the land application of biosolids in excess of acceptable radionuclide levels. The city also contracts with ORNL to perform independent radionuclide analyses as a cross-check to ensure compliance with the established 4 mrem/yr criteria. Since many of the 23 radionuclides are not present in the City of Oak Ridge biosolids, analytical action levels are only established for known, key radionuclides to prevent the inadvertent application of biosolids confirmed to contain elevated levels of radionuclides. To date, only one action level has been triggered, resulting in a closer examination of the material but not important enough to halt application operations.

Since 1999, the City of Oak Ridge began accepting ORNL biosolids in the existing land application program. In addition, multiple industrial sources with the potential to discharge radionuclides exist, resulting in a extremely limited capacity for future industrial growth within the boundaries of Oak Ridge. In response, the City of Oak Ridge petitioned the TDEC-Division of Radiological Health to approve an increase in radionuclide land application loading criteria from that based on 4 mrem/yr to 10 mrem/yr. In June 1999, TDEC responded with a letter (*Appendix A*) concurring with the increase. The specific impacts upon human health and the environment will be assessed in this National Environmental Policy Act (NEPA) document as part of the decision-making process to determine if the 10 mrem/yr planning level for the Oak Ridge Reservation Biosolids Land Application Sites and the addition of treated WETF effluents to the sewer system should be implemented.

It should be noted that the existing and proposed radionuclide planning levels reflect the conceptual, worst-case exposure scenario that a person residing on the actual application site, eating food and drinking water exposed to the radionuclides that have been land-applied with the city biosolids. In reality, the existing sites are isolated from members of the public and access is controlled through ORR security because of the application site proximity to the Y-12 Plant. The City of Oak Ridge issues permit limits to industrial users based upon effluent discharge limits to East Fork Poplar Creek (EFPC) and ORR biosolids land application contaminant restrictions listed in existing permits and agreements with EPA, TDEC and DOE (*Section 6.0*). Industrial discharge limits are developed using these restrictions, the contaminant removal efficiency of the POTW and the needs of the industrial user petitioning to discharge to the city sanitary sewer system. At a minimum, the acceptance of contaminants prior to treatment at the POTW must not cause the POTW to exceed contaminant limitations on the effluent discharge to EFPC or on the ORR Biosolids Land Application Sites. Put simply, the limits for acceptance must not exceed the end point (e.g., ORR application sites) contaminant limits.

Specific contaminant limits are developed by assessing the needs of all industrial users in the City of Oak Ridge Pre-treatment Program. A worst-case scenario is used in developing the corresponding limit such that all permittees discharge at their maximum contaminant levels at one point in time. Although this scenario is extremely conservative and unlikely to occur in day to day operations of a POTW, this is the accepted method of contaminant limit development within EPA and TDEC.

Sanitary sewer discharge limits are issued to industrial users directly from the City of Oak Ridge. Larger industrial users, such as the Y-12 Plant, have users connected to their portion of the sewer system which require management by the permit holder to ensure that discharge limits are not exceeded. For example, the Y-12 Plant may have a number of building drains and other sanitary effluents that could enter the Y-12 sewer system. The BWXT Sanitary Sewer Coordinator would develop limits for each of the "internal users" based upon the Y-12 Plant IDP contaminant limits issued to them by the city. Limits to internal users are based upon available capacity, room for growth and process need within the Y-12 Sewer System. The addition of treated WETF effluents to the system are no exception and will be managed by BWXT as with any other internal user of the Y-12 sewer system.

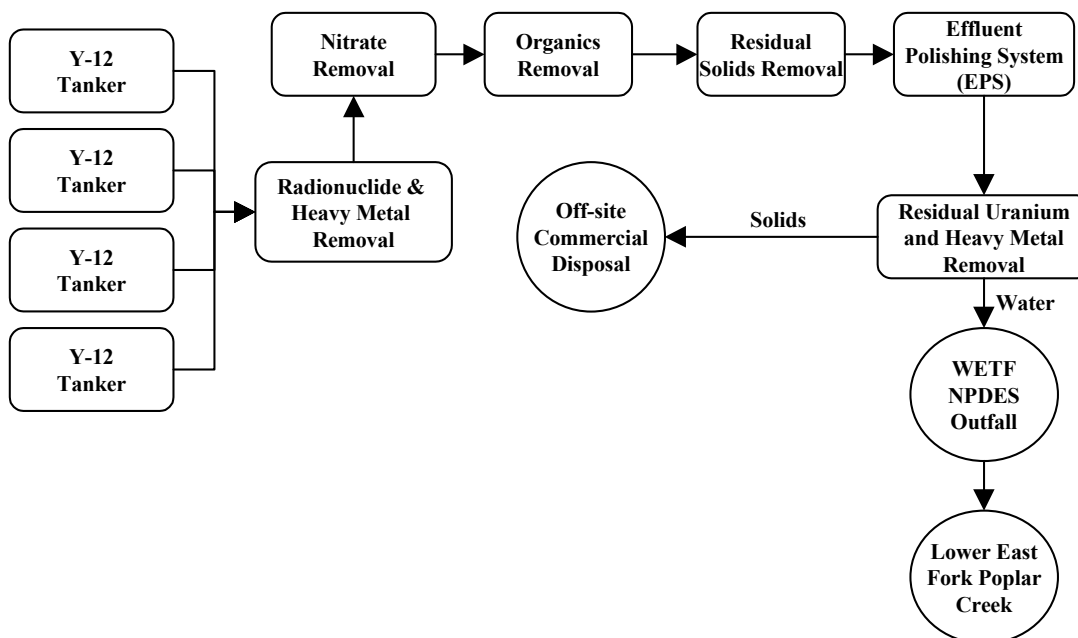
1.2.2 West End Treatment Facility

In May 2000, a sanitary sewer assessment (WSMS 2000) was conducted that assessed the feasibility and analyzed the regulatory impacts of allowing treated wastewaters from WETF to be directly discharged into the Y-12 Sewer System thereby reaching the City of Oak Ridge Sewer System and ultimately, the ORR Biosolids Land Application Sites. The study recommended sanitary sewer discharges as a viable, cost savings alternative to the current method of treating all of the wastewaters at EPS and discharging effluents through the WETF NPDES Outfall to East Fork Poplar Creek (EFPC).

WETF receives batch wastewater from a number of generators throughout the Y-12 Plant Site, as well as other approved DOE-ORR generators. The characteristics of these wastewaters vary greatly in constituent and concentration levels. Existing WETF operations consist of head-end treatment (heavy metal and radionuclide removal), bio-denitrification (nitrate removal), bio-oxidation (organic compound removal), Effluent Polishing System (EPS) and a number of other tanks used for storage of solids and wastewaters. WETF has had a number of process modifications within the physical configuration of the wastewater treatment processes increasing the removal of contaminants such as heavy metals, radionuclides, and organic compounds.

As a result, one process, the Effluent Polishing System (EPS) may not be required to used to treat wastewaters that have very low contaminant levels. Process changes, accelerated tank clean-out efforts and the prohibition on the acceptance of listed hazardous wastes have resulted in more cost-effective ways to manage treated wastewaters at WETF. *Figure 1.2* provides a simplified diagram of the current operational configuration of WETF.

Figure 1.2. Current WETF Operational Configuration



Prior to 1994, head-end treatment was not available and EPS was primarily utilized to remove heavy metals and radionuclides. Since 1994, head-end treatment has been extremely effective in removing the majority of heavy metals and radionuclides contained within wastewater treatment batches processed at WETF. Due to higher operating costs at EPS, increased heavy metal and radionuclide removal efficiency of head-end treatment, accelerated tank clean-out operations and prohibition of all listed RCRA wastes by Bechtel Jacobs Company and DOE-EM at WETF, discharges to the sanitary sewer system without treatment at EPS were evaluated and recommended as a viable option in the sewer assessment (WSMS 2000).

Because wastewaters are processed through WETF as batches, each 500,000-gallon batch has its own unique characteristics that, depending upon heavy metal and radionuclide concentrations, may or may not require treatment through EPS.

Some batches of wastewater generated have very low levels of contaminants that could meet Y-12 Sanitary Sewer System discharge criteria with a slight modification to the existing Y-12 Industrial Discharge Permit (IDP) for nickel and uranium. Based upon estimates performed as a part of the sewer assessment (WSMS 2000), a cost savings of approximately \$133,000 per year could be realized by utilizing the Y-12 sanitary sewer system in conjunction with minimizing the use of EPS (50%) to treat only those batches of wastewater that would require additional treatment to meet established discharge criteria.

Although it is understood that the City of Oak Ridge cannot impose a uranium limit on discharges from the Y-12 Plant, the city has indicated that it reserves the right to refuse any discharges to the Oak Ridge Sewer System that may be considered problematic with their operations. In discussions held with the city during the time of the sanitary sewer study, a proposed limit of 3,785 total grams of uranium which corresponds to a 2 mg/l at a flow rate of 5 gpm for each 500,000 gallon tank had been discussed. This limit was developed such that treated wastewaters discharged to the Y-12 and City of Oak Ridge sanitary sewer systems would not impact the city's ability to treat wastewaters and beneficially re-use the biosolids produced at the city POTW. The limit is also feasible for WETF operations such that an entire 500,000-gallon tank of treated wastewater can be discharged in a reasonable amount of time (e.g., 70 days at the proposed uranium limit). The environmental impacts for the proposed radionuclide planning levels will be evaluated in this NEPA analysis.

1.3 SCOPE OF THE ANALYSIS

This Environmental Assessment (EA) evaluates the impacts of (1) increasing radionuclide loading planning levels for ORR Biosolids Land Application Sites from those previously modeled at 4 mrem/yr to newly modeled planning levels assuming a 10 mrem/yr dose rate; (2) the addition of the Y-12 Plant West End Treatment Facility (WETF) into the Y-12 and City of Oak Ridge Sewer Systems; and (3) no action.

The proposed action of converting from a liquid, Class B (i.e., biologically active) to a solid, Class A (i.e., non-biologically active) biosolids material is not addressed in this document, because it has been previously assessed in a previous EA (DOE 1996) and re-visited in a technical memorandum (H. Rice to D. Allen 2000) and found to not have significant impacts upon the ORR.

This EA conforms to the requirements of the Council on Environmental Quality (CEQ) regulations (40 *CFR* Parts 1500-1508) implementing the National Environmental Policy Act of 1969 (NEPA) and DOE NEPA Implementing Procedures (10 *CFR* 1021).